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Airport Development and Operation Problems

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AIRPORT DEVELOPMENT AND OPERATION PROBLEMS

A Comparative Study of Five Medium Size Cities

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We are buying airplanes that haven't yet been fully designed with millions of dollars we don't have—and we are going to operate them off airports that are too small in an air traffic system that is too slow—and we must fill them with more passengers than we have ever carried before.[1]

THE impact of the jet age on major metropolitan airports has been the object of much discussion and study.[2] Most of the investigation has revolved around the problems related to landing and take-off requirements, noise problems, fueling facilities, and terminal requirements of the 118 passenger jets which will begin scheduled operations within the next two years. However, not all the problems lie with these major terminals. As the domestic air network has developed, an increasing number of medium-size cities in the United States have been faced with the problems which attend the development and operation of a municipal airport. As traffic increases and as larger aircraft are moved down to shorter stage service to integrate jet long haul service, a substantial burden of expansion is placed upon the airports of class III and IV.

TABLE 1
FEDERAL AID PROGRAM
1947-55

Class of Airport	*Number*	*Federal Aid*
I	240	$ 3,928,000
II	270	13,035,000
III	339	31,240,000
IV	224	50,005,000
V	78	45,537,000
VI and over	54	87,604,000

Source: CAA, Statistical Handbook of Civil Aviation, 1956.

These Class III and IV airports are classed on the basis of runway lengths of from 3,500 to 5,500 feet although the pace of technological advance of aircraft presses constantly upon communities operating such airports to increase runway length and strength. These 562 airports have accounted for over $80 million in federal aid in the period

[1] *Aviation Age*, Mar. 1956, Speech by Robert Aldrich.
[2] For example see *23 Journal of Air Law and Commerce No. 1.* The bulk of this issue was devoted to airport problems of the major terminals in the jet age.

1947-1955. Although the problems of these individual airports are not of the magnitude represented at the major terminals, they are nevertheless an important part of community activity at such cities.

The writer had the opportunity to visit and study five municipal airports at medium-size cities. They were not "typical" airports, rather they were chosen on the basis of their history of development and their characteristics to illustrate various conditions and problems which attend the construction and operation of a municipal airport of this type. At each of the airports included in the study the history of airport development was traced and the costs of construction, where available, were compiled. The expenses and revenues of each facility were examined and related to the various airport functions. Passenger and aircraft traffic burdens at the airports were reviewed and, finally, the organization structure for management of each of the operations was studied to gain insight into the function of executive leadership for municipal airport operation.

In 1946, a Harvard study of airport problems provided a basis for inquiry by pointing out some questions which remain unanswered today for many municipal airports. They include: By what standards can inadequacies in present practices be determined and corrected? Should airport services continue to be provided at public expense? If airport users are to pay for their privileges, how much and on what basis should they be charged? Can airports be made self-supporting without placing an undue burden on aviation?[3] Some of the problems cited by the Bollinger Report were (1) poor cost control, (2) no soundly conceived long range financial plans, and (3) no generally accepted cost allocation to the various airport users.

These questions and problems were related to the cities included in this study to determine the extent to which they have been answered or solved.

Airport of City "A"

City A saw the introduction of aviation when a dirt landing area was cleared near town as a practice field for Army Air Corps flyers in 1917. During the early 1920's several private flying fields were established near the community with a rapid turnover of operators who tried, unsuccessfully, to capitalize on the new art of flying. By 1928, the community recognized that air transport was to be an important part of community activity which could not be operated under conventional private business enterprise methods. The "sunken" capital investment was high, the demand erratic, and the operating costs high. Initial interest resulted in a bond issue election to authorize $75,000 for establishing a municipal airport.

The new facility was dedicated in October 1930 and consisted of 300 acres purchased at a cost of $62,000 with the balance of the funds

[3] Lynn L. Bollinger, Alan Passen, and Robert E. McElfresh, *Terminal Airport Financing and Management*, (Andover: The Andover Press, 1946), p. 4 (This study will hereafter be referred to as the Bollinger Report.)

spent to develop a 1,000 foot gravel runway, a terminal building, and fueling facilities. Either by lack of interest, or by failure of air transport to realize the optimistic predictions of its development, no major work was accomplished until during World War II. During the war the Corps of Engineers spent about $350,000 for improvement of ramps and runways.

The next major indication of interest by the city in airport improvements resulted in a November 1950 bond election which proposed airport bonds in the amount of $350,000. There were notes of dissent as evidenced by paid advertisements asking "How can the building of a new air depot *for the benefit of the airlines* be classed as a need of the taxpayer?" The Citizens Advisory Committee was vocal in support of the bonds and bemoaned "Our gateway to the air traveler . . . how red are our faces . . . if we put up half the cost of replacing this disgrace with a modern air terminal, Uncle Sam will pay the rest." The federal aid program was curtailed through 1954 and, although the airport bonds passed by a slim margin, the same terminal building remains in 1957 as the city's gateway to the air traveler. The amount authorized has been spent on runway and small aircraft hangar improvements in an attempt to keep pace with the advance of air transport technology. The field's runways are the least adequate of the cities in this study, with three major runways ranging in length from 3,195 to 4,612 feet. Additional facilities include two large wooden hangars used by fixed base operators, three "T" hangars for small aircraft shelter, and an obsolete control tower which must be abandoned in wind conditions exceeding 40 knots per hour.

With reactivation of the federal aid program, the city again came to the people seeking authority to issue $1,200,000 in airport bonds. This amount plus funds remaining from the 1950 bond issue will make up the city's share of $1,356,000 of a total estimated cost of $2,743,472. Only $500,000 is designated for terminal building improvements with the balance for land acquisition, runway and lighting improvements. Table 2 indicates the division of estimated capital costs of the airport, including currently authorized projects between municipal and federal funds.

TABLE 2
ESTIMATED CAPITAL INVESTMENT
AIRPORT A

Municipal Bond Issue Funds		
1928-Current Authorizations		$1,827,741
Federal Aid		
WPA Project (1937)	$ 37,202	
Wartime Expenditures	356,000	
Current Matching Funds	1,387,472	
Total		1,780,674
Total estimated investment including currently authorized projects		3,608,415

The contribution of local and federal funds has been approximately equal. With current operating revenues of between $70,000 and $80,000 per year the capital turnover is exceedingly low.

Operating Revenues and Expenses

Table 3 is a consolidated operating statement for the years 1952 through 1955. The items bear some explanation. The city has an agreement with its exclusive fuel supplier that 3 cents per gallon "field rental" is to be "paid" to the city for each gallon of fuel pumped by city operated fueling facilities. Some fuel is pumped by fixed base operators for which the operator pays the city 3 cents per gallon and the fuel supplier pays the city an additional 3 cents per gallon. Attempting to trace these payments is somewhat confusing since the amount paid by the supplier (this is actually a price discount) is added to Gas and Oil Sales, while the amount paid by the fixed base operator is added to Concessions revenue. In addition, a part of the income from

TABLE 3
AIRPORT OPERATING STATEMENTS 1952-55
CITY A

	Fiscal 1955	*Fiscal* 1954*	*Calendar* 1953*	*Calendar 1952*
Operating Revenue				
Gas and Oil Sales	$ 90,188	$ 89,945	$ 85,961	$ 82,126
Less C.O.G.S.†	58,145	60,767	58,286	55,023
Gross Profit	32,043	29,178	27,674	27,103
Other Revenue				
Rental Hangars & Stg.	18,068	16,951	15,431	15,601
Landing Fees	12,805	12,360	10,455	9,119
Rental Adm. Bldg.	7,748	6,447	5,499	3,313
CAA Rent	4	305	313	319
Concessions	4,385	3,958	3,847	3,329
Total Other Revenue	43,009	40,021	35,545	31,681
Total Operating Revenue	75,052	69,199	63,220	58,784
Operating Expenses				
Salaries and Wages	26,390	26,815	25,494	22,418
Other Services	3,295	5,122	5,053	4,791
Materials & Supplies	421	638	678	628
Fixed Charges	451	446	446	446
Maintenance	17,112	18,545	16,148	8,686
Total Operating Exp.	47,670	51,565	47,818	36,964
Net Operating Income	27,382	17,634	15,402	21,820
Gas Sales (gallons)	211,532	216,477	210,911	204,770
Oil Sales (gallons)	990	1,237	955	755

* There is a three month overlap of Fiscal 1954 and Calendar 1953 because of change in accounting system. This is to keep twelve months in each period for comparison.

† Cost of goods sold.

the airport restaurant is added to Rental Administration Building and part to Concessions. The operating expenses are designated by type and present no obvious basis for functional allocation. In order to determine the net revenue accruing to each of the airport functions a detailed analysis of the source of income and the nature of expense was necessary. For example, the bulk of the Salaries and Wages account was to the benefit of the city Gas and Oil Business, and when this is charged against the Gross Profit of that operation it is clear that the net revenues to the city would have been increased had fueling operations been franchised to private operators.

Rentals at the airport appear to have been individually negotiated without uniform application to tenants. For example, the airline office rentals for the three airlines serving the city vary from $2.65 per square foot annually to $4.17 (the latter, incidentally, is charged for the last occupied and least desirable space). The coffee shop pays 5 per cent of gross sales on food items and 10 per cent on non-food items. Rent-car operators are charged $150 per month for approximately 40 square feet of space, amounting for one of the operators to over 50 per cent of his gross sales at the airport.

Landing Fees are of the sliding scale type with no provision for a weight adjustment, as follows:

First daily schedule	$100 per month
Second daily schedule	75
Third daily schedule	50
Each additional schedule	25

Thus there is a drastic reduction in average fees for any one carrier as the number of daily schedules increases. A weak carrier operating

TABLE 4
CITY A
ESTIMATED ALLOCATION OF INCOME AND EXPENSES BY FUNCTION

Landing Area			
Income			
Landing Fees	$12,805		
Gulf Field Rent	6,346		
Ragsdale Field Rent	2,266		
CAA Rent	4		
Gross Margin Gas and Oil	25,697	$47,117	
Expenses			
Personnel Services	$19,500		
Maintenance	13,777		
Other Services	1,090		
Materials and Supplies	141		
Fixed Charges	149	34,665	
			$12,452
Hangars			
Income			
Rentals (Hangars)	$ 9,480		
Storage	8,588	$18,068	

TABLE 4 (Continued)

Expenses			
Maintenance	$ 1,500		
Other Services	1,099		
Materials and Supplies	141		
Fixed Charges	149	2,888	
			15,180
Terminal Building			
Income			
Rentals	$ 7,748		
Concessions	2,119	$ 9,867	
Expenses			
Passenger Services	$ 6,890		
Maintenance	1,840		
Other Services	1,010		
Materials and Supplies	141		
Fixed Charges	149	$10,118	(251)
OPERATING PROFIT			$27,382

smaller equipment and few schedules pays a much higher average landing fee than a stronger carrier operating larger aircraft and a greater number of schedules.

Government offices pay only nominal rent although they occupy about 23 per cent of the ground floor space in the terminal building. Hangar rentals derive about one-half from fixed base operator rentals for the two large hangars and one-half from city-operated "T" hangars and tie down services. Other income items are minor and the airport has no income from other sources (agricultural or industrial).

Table 4 indicates the estimated functional allocation of incomes and expenses with the Landing Area and Hangars showing substantial net income and the Terminal Building showing an estimated net loss of $251. This is surprising considering the traffic density of the field and the fact that the airport is bordered on three sides by residential districts which would be expected to increase concession and restaurant incomes.

Traffic

The three commercial airlines serving the city operate about 30 daily schedules which make up 17 per cent of the traffic movements. Military movements account for 10 per cent of the traffic and civil aircraft for 73 per cent of the total traffic movements reported by the CAA control tower.

The airlines enplaned 61,972 passengers for an average of 6.2 passengers enplaned per flight. Based on the "Survey of Buying Power" 1955 population estimate there were 336 passengers enplaned per thousand population.

Management

City A has a rather complex multi-level channel of authority and responsibility between its Airport Manager and the operating head of

the city administration, the City Manager. The airport executive reports to the Director of Parks and Cemeteries, who reports to the Director of Public Works, who reports to the City Manager. The Airport Manager is the lowest paid of any in this study with a salary scale of less than $5,000 per year.

These circumstances place formidable obstacles in the path of dynamic and aggressive airport administration and development. It seems clear that a direct chain of command and a capable airport executive will be a vital part of the future operation of this $3 million facility.

Summary

City A's airport is unique because of the obvious lack of interest by the city in development of an adequate air terminal in the public interest. Although the city has very favorable traffic characteristics and the people have repeatedly supported bond issues for improvement, this city has the least adequate facility of the municipalities included in this study. Currently authorized projects promise to provide adequate physical facilities but important administrative and policy changes will be required if the airport is to best serve the needs of air commerce and of the community.

Airport of City "B"

As in the case of City A, municipal interest in developing airport facilities began in 1928 when the first airport was built of grass runways. A small hangar was built in 1931 to house the frail craft of the day. The paved runways and taxi strips were an outgrowth of World War II when the federal government leased the airport at an annual rental of $1 for development as a military air base. It was returned to full city use in 1949.

Shortly after the close of the War, in December 1945, the people authorized $300,000 in General Obligation Bonds for airport improvements. A modern terminal building was completed in 1949 under 50-50 federal aid matching funds programs. The terminal was built at a cost of $514,000. The bulk of the remaining physical facilities were provided by the federal government during the War at no cost to the city. The fine landing area includes three major runways ranging in length from 6,477 to 6,502 feet.

TABLE 5
CAPITAL COSTS
CITY B

Source	*Amount*
Municipal Funds	$ 555,174
Federal Funds (non-military)	694,601
Federal Funds (military)	4,684,000
Total	$5,933,775

The municipal investment makes up less than one-tenth of total capital investment and less than one-half of the non-military investment. Using total incomes of the facility of $134,684 and a non-military investment of $1,249,775, the capital turnover was only .17 for 1955. Of course, if the military investment is considered the capital turn is infinitesimal.

Other physical facilities at the airport include 5 large hangars, 40 "T" hangars, and a number of military buildings which have been converted to airport or commercial use. In addition the field is located in the heart of an irrigated agricultural area and the airport administration has exploited this locational advantage by sharecropping with a local farmer who irrigates the acreage around the runways and dry-land farms the area between the runways.

Operating Revenues and Expenses

Airport B undoubtedly maintains the best accounting of operations of the airports included in this study. The problem of estimated allocation to airport functions by the researcher is not present. A cost accounting system allocates revenues and expenses to functions, i.e. Terminal Building, Landing Area, etc.

The airport has earned substantial profits and the administration proudly proclaims that the field is a "paying" airport, paying all operating expenses and capital costs. It should be noted in passing, however, that over one-half of the revenues of the facility derive from non-airport activities and that the city has borne only a small part of the capital costs. This is not to minimize the accomplishments of the administration in developing a "paying" airport—rather to emphasize

TABLE 6
OPERATING STATEMENTS
CITY B

	Fiscal 1955	*Fiscal 1954*	*Fiscal 1953*	*Fiscal 1952*
Landing Area				
Fees	$ 14,568	$ 13,977		
Gas (Comm.)	4,592	4,095		
Agric. (Dry Land)	1,248			
Total	20,408	18,072	$ 20,447	$19,315
Hangar Area				
Rentals	19,754	16,060	15,870	13,558
Terminal				
Airlines	2,951	2,198		
Concessions	7,656	5,865		
Management	5,394	4,585		
Misc.	2,079	170		
	18,081	12,818	13,668	13,078

TABLE 6 (Continued)

Indust. & Agric.				
Bldg. Rentals	34,786	37,842		
Land Rentals	18,488	22,007		
Agric. (Irrigated)	21,704	15,979		
Water Sales	1,428	1,530		
	76,405	77,359	72,911	51,794
Total Income	134,628	124,309	122,896	97,746
Expenses				
Landing Area	31,198	34,311		
Hangar	7,787	7,610		
Terminal	16,458	14,684		
Indust. & Agric.	22,461	20,789		
	77,905	77,394	72,588	71,962
PROFIT	56,743	46,915	50,308	25,784

that this has been accomplished largely by developing non-airport activities. Based on airport activities alone, an operating profit of something over $500 is certainly far short of covering capital costs.

Landing Area revenues derive mainly from dry land farming (between the runways), landing fees, and income from the gas and oil franchise held by fixed base operators. Farming income is based on a devision of from one-fourth to one-third of the proceeds of the operation paid by the farmer to the airport. Dry land farming between the runways is classed as Landing Area income and the irrigated farming around the runways is called Agricultural income. About 95 per cent of the landing fee payments are paid by the two commercial airlines serving the city. An unusual feature is the assessment of landing fees against military movements, although such income is relatively small. The current landing fee contract is of the sliding scale type with weight frequency adjustment. It is the intent of the administration to alter the scale of fees to a simple weight basis charging about 6 cents per thousand pounds of gross landing weight for each flight of the commercial airlines. The gas and oil franchise income resulted from payment of 2 cents per gallon pumped by fixed base operators amounting to about $4,500 per year.

Hangar incomes derive from rental of the city owned "T" hangars and from fixed base operator rentals of the large hangars based on an annual charge of 25 cents per square foot with the lessee paying insurance and utilities. The Industrial and Agricultural income comes from the irrigated farming operations, land and building rentals, and sale of water from airport wells. The farming income is based on the same per cent of proceeds agreement in effect for dry land farming. Non-aviation building rentals result from lease of surplus buildings remaining after the war and from new buildings built by the city or by lessees since 1949. Industrial tenants are encouraged to lease land

for building purposes. For tax purposes the tenant writes the building off over a minimum period with title passing to the city and the lessee having option to lease the building for an additional period equal to his ownership time.

Concession revenues make up the most important part of Terminal Building incomes with the Airport Cafe making the greatest contribution. The Cafe is charged 8 per cent of gross sales on food items and 7 per cent on non-food items, amounting in 1955 to $6,219.78. Airlines pay $3.50 per square foot annually which includes rent and building management. Federal government offices pay $1 per year plus a full share of the building management costs.

In this age of mechanical merchandisers one is surprised by the complete absence of the variety of vending machines which usually is seen in transportation terminals. This is a part of the airport policy which permits only air trip insurance machines to be installed in the lobby. The administration feels that the small amount of revenue produced by other machines does not justify the unsightly appearance or janitorial problems which they present.

Traffic

The 18 commercial airline flights per day through the facility make up about 11 per cent of the traffic movements. Military movements constitute 18 per cent and the civil movements about 71 per cent.

The "Survey of Buying Power" estimates the city's population as 129,000 and passenger boardings for the year 1955 were reported as 37,775, or about 270 passengers boarded per thousand population. The boardings by the airlines represented 5.3 passengers per flight.

Management

City B is unique among the airports studied in its organization for management of the airport. The city code clearly states that the Director of Aviation and his Airport Board are responsible directly to the city legislative group for airport matters. The Director is reportedly one of the highest paid airport administrators employed by medium size cities with a salary scale in excess of $10,000 per year. The Airport Board consists of three citizens who serve three year terms. By tradition they cannot succeed themselves nor can a citizen who has any direct financial interest in community aviation activities serve on the Board. The result has been a strong and independent airport administration free of most of the vested interest and political forces which so often are an integral part of airport activities.

The airport has its own fire department manned by airport personnel and operated with specialized aviation fire fighting equipment owned by the airport. The airport employs only one full time fireman. The remaining full time airport employees are trained fire fighters

and are given rent-free quarters at the airport in return for performing standby fire duty during the time when not engaged in regular airport duties. The Director of Aviation is furnished a two-way radio equipped auto complete with flashing red light and siren and the city code bestows upon this executive all of the powers of the Chief of Police on airport premises.

Summary

City B has aggressively developed its airport and the success of the enterprise enjoys mute testimony in the operating record of the facility. The airport is a fine and adequate field and, with the help of substantial non-airport income, has become a "paying" airport covering all costs including municipal capital costs. The field is well managed and its unique organization for management provides interesting comparison.

Airport of City "C"

Again, 1928 was the date which marked the beginning of community interest in developing a municipal airport. Because of the financial and operational difficulties experienced by the private flying field operator, City C sought authorization by the voters for the issuance of $95,000 in General Obligation Bonds for the purpose of purchasing the field and developing a municipal airport. The field remained until 1952 as the city's airport, but the longest runway was only 3,500 feet and technological progress spelled doom to its further operation. Introduction of postwar equipment by the commercial airline serving the city forced suspending operations at the field and moving to a military landing area over 10 miles away. The electorate in 1950 authorized $300,000 in bonds for construction of a new municipal field since highway and railroad location prevented expanding the old field.

The site for the new airport was selected just four miles from the city and thus City C presents for analysis a case where the airport has been constructed on virgin land since the war. The site selected comprised about 480 acres purchased at a cost of $128,600. The Bond Issue funds proved inadequate (supplemented by disposal of surplus property) and $125,000 in additional funds was procured through the issuance of Airport Warrants bearing 4 per cent interest.

The field has paved runways 4,000 and 5,400 feet in length constructed of 12-inch crushed stone base and 2-inch hot-mix asphaltic concrete surface. Service was inaugurated during December 1953. A "temporary" masonry terminal building complete with air conditioning serves the air travelers' needs. The three large hangars and control tower were moved from the old airport to make up the balance of the physical facilities.

TABLE 7
AIRPORT CAPITAL COSTS
CITY C

	Amounts	*Per Cent*
Landing Area		
Runways, Taxiways, Ramps	$ 752,301	
Lighting	59,965	
Land	128,600	
Total	940,866	82
Hangars		
30 T Hangars	72,056	
Moving 3 Large Hangars	71,536	
Total	143,592	12
Terminal Buildings		
Temporary Terminal	48,122	
Control Tower Move	8,973	
Architect	5,305	
Total	62,400	6
Total Capital Costs	1,146,858	100
Federal Air Share	495,247	43
City Share	651,611	57

The heavy capital investment demands of the Landing Area are clearly illustrated in this case. The sunken capital investment requirements in providing minimum facilities is exceedingly high. The city has shared over half of this expenditure under federal matching funds programs.

Operating Expenses and Revenues

As with City A, City C maintains no cost accounting system for the purpose of allocating airport revenues and expenses to the airport functions. In order to estimate the net incomes accruing to each of the airport functions it was necessary to allocate revenues and expenses on the basis of estimates, airport records, and interviews with city officials. In the case of expenses, the city accounting system records them as shown in the following table.

TABLE 8
OPERATION EXPENSES
CITY C MUNICIPAL AIRPORT

Type of Expense	*1955-56 (Budget)*	*1954-55*	*1953-54*
Salaries and Wages			
Management	$ 4,500	$ 4,200	$ 3,600
Clerk Hire	2,100		
Labor Operations	22,966	22,848	20,596
Extra Help	1,500	1,963	5,148
Total Salaries	31,066	29,011	29,345

TABLE 8 (Continued)

Supplies	2,953	2,336	3,399
Maint. of Structures	515	1,644	790
Maint. of Equipment	4,883	4,454	5,313
Misc. Services	6,660	6,728	7,681
Sundry	150	150	140
Total other expense	15,161	15,316	17,323
Total Operation Expenses	46,227	44,327	46,668

The relatively high amounts accruing to the Labor Operations account reflects the operation by the city of a Gas and Oil Business, and the bulk of it must be set off against the Gross Profit of that enterprise. The revenues are recorded by source and are more readily allocable than expenses because the source of the revenue identifies it with its functional classification.

TABLE 9
OPERATING REVENUES
CITY C MUNICIPAL AIRPORT

	Estimated 1955-56	*1954-55*	*1953-54*
Gross Profit	$25,000	$24,556	$16,268
Landing Fees	5,650	5,597	3,754
Gasoline Storage Tank	600	600	525
Airport Pasture	100	100	191
Airport Cafe	360	180	
Weather Bureau Bldg.	899	899	756
Terminal Building	1,826	1,826	1,729
Pioneer Electric Serv.			150
Airport			53
Large Hangar	2,900	2,891	3,096
"T" Hangars	5,500	5,704	3,620
CAA and Tower	909	909	752
2 Small Hangars	2,300	2,529	949
CAL Hangar Space	45	45	
Tye Airport Storage			38
Airport Maps and Misc.		8	3
Airport Gas Tax Refund	600	392	644
Telephone Booth	300	300	300
Tel. Coin Station	140	146	134
Vending Machines	160	159	134
Other Revenues			1
Locker Rent	5	5	
Total	$47,199	$46,846	$33,095

Aside from the Gross Profit from the Gas and Oil Business, the largest source of income is from landing fees. The landing fees are based on a combination sliding scale and weight-frequency adjustment. With only one carrier serving the city there is no problem of equity in setting landing fees.

TABLE 10
LANDING FEES—CITY C

For the first 12 daily schedules (up to 27,000 pounds gross wt.)	$40 per schedule
Additional daily schedules	$25 per schedule
Charge per flight for unscheduled operations	$1 each
Additional charge per schedule per month for each 1,000 lbs. gross wt. in excess of 27,000	$1 per schedule

Airline office space at $152 per month and rent-car agents at $40 per month each provide the bulk of the terminal building income. The airport coffee shop pays only nominal rent and, in fact, the city was forced to subsidize this operation at one time to keep it in operation. Federal government office rentals reflect building management expenses. The other important revenues derive from the city operated "T" hangars and rentals paid by fixed base operators for the three large hangars.

The income statement with allocations to the various airport functions gives insight into the net revenue position of each of the functions. An item included in the functional income statement which does not appear in the expense and revenue statements of the city is $800 estimated expenditure by the street department for work done at the airport. The Hangar function makes the best showing, the Landing Area turned a smaller profit and the Terminal Building incurred a substantial loss in its operation.

TABLE 11
OPERATING STATEMENT
CITY C MUNICIPAL AIRPORT
FISCAL 1955

Landing Area		
Revenues		
Gross Margin (Gasoline)	$24,556	
Landing Fees	5,597	
Storage Tank Rental	600	
Airport Pasture	100	
Gas Tax Refund	392	
Total Revenues		$31,245
Expenses		
Labor Operations	20,688	
Extra Help	981	
Supplies	778	
Maintenance—Equipment	1,484	
Misc. Services	2,242	
Sundry	50	
Total Expenses	26,223	
Estimated Street Dept. Exp.	800	27,023

TABLE 11 (Continued)

Landing Area Net Revenue			$4,222
Hangars			
Revenues			
CAL Hangar Space	45		
Large Hangar	2,891		
"T" Hangars	5,704		
Two Small Hangars	2,529		
Total Revenues		11,169	
Expenses			
Maintenance—Structures	548		
Maintenance—Equipment	1,485		
Misc. Services	2,243		
Sundry	50		
Total Expenses		4,326	
Hangars Net Revenue			6,843
Terminal Building			
Revenues			
Airport Cafe	180		
Weather Bureau	899		
Terminal Space Rentals	1,826		
CAA and Tower Rent	909		
Misc.	8		
Telephone Booth	300		
Telephone Coin Stations	146		
Vending Machines	159		
Locker Rent	5		
Total Revenues		4,432	
Expenses			
Airport Management	4,200		
Custodian	2,160		
Extra Help	982		
Supplies	1,558		
Maintenance—Structures	1,096		
Maintenance—Equipment	1,485		
Misc. Services	2,243		
Sundry	50		
Total Expenses		13,774	
Terminal Building Net Revenue			(9,342)
NET OPERATING PROFIT			$1,723

Allocations of expenses are estimates based on discussions with the Airport Manager and are at best only estimates since no cost accounting records of this type are maintained.

Traffic

City C was the smallest of the cities studied with the "Survey of Buying Power" estimating the 1956 population of the community at 62,000. There were 17,221 passengers boarded by the commercial airline serving the city in 1955 amounting to an average of 3.4 passengers per flight. The passenger boardings represented about 278 enplaned passengers per thousand population.

The commercial airline traffic represented about 18 per cent of the traffic movements, military movements 11 per cent, and civil aircraft movements 71 per cent.

Management

The organization structure of City C is of the City Manager type with all major department heads reporting directly to this officer. The airport makes up one of these departments and the Airport Manager is directly subordinate to the City Manager. Because of this, a close liaison exists between the airport administration and top city administration. Airport matters receive high level consideration through direct lines of authority and responsibility.

Summary

City C represents a good example of a medium size city which has built its municipal airport on virgin land within recent years. It provides a striking example of the magnitude of the capital requirements necessary to provide even minimum facilities for commercial airline service. The airport has an exceedingly "good press" and apparently has wholehearted community support and pride in its operation. The people have asked only that it pay its way in terms of operating expenses—an objective which has been accomplished after only three years of operation.

Some questions arise, however, which will be examined in the conclusions. These include the city operation of gas and oil businesses and the accounting practices of the airport.

AIRPORT OF CITY "D"

Unlike the preceding cities, City D did not become interested in public financing of an airport until 1941. At that time the citizens voted $100,000 in General Obligation Bonds to "give the city a landing field that will compare with any in the state." A site was selected and 528 acres were purchased at $85 per acre. Of course, events later in 1941 intensified military air base development and another site near City D was selected for an Army Air Corps training field. Paved runways ranging in length from 5,500 to 5,714 feet were constructed and many buildings were built for administration and housing. After the war the city administration proposed to the electorate that the old municipal field be abandoned in favor of the military facility which had been offered to the city by the federal government. During 1948, a bond issue election proposed $100,000 for conversion of the military base to a municipal airport.

These funds, along with funds derived from the disposal of surplus land and property provided the city's share of $310,000 spent on the terminal building and landing area for the conversion. The terminal building is a modern masonry structure built at a cost of $210,000

and contains approximately 8,200 square feet (excluding the control tower). Estimates of federal government wartime expenditures were not available at City D, but obviously the bulk of the investment in the field was from this source.

In addition to fine runway and terminal building facilities, the city owns a number of large hangars left by the military development and a number of sub-standard barracks buildings which are rented by the city as apartment units. They are unsightly buildings and it is obvious that any revenues which they provide are of a temporary nature unless substantial repair work is accomplished.

Operating Revenues and Expenses

Again, the researcher is faced with accounting data based on the nature of the expense or the source of income. City D operates a gas and oil business so that the salaries and other expenses incidental to this operation should be charged against the gross profit of the enterprise. This city does not even indicate a gross profit, but rather shows gross sales as revenue and includes the cost of goods sold in an operational expense account. The following table indicates the account classification for expenses.

TABLE 12
AIRPORT SUMMARY

Operational Expense	*1956**	*1955*	*1954*
Salaries and Wages	$31,244	$30,229	$29,120
Supplies	5,160	198	4,514
Maintenance of Structures	1,000	486	5,021
Maintenance of Equipment	3,250	2,180	3,104
Misc. Services	11,145	28,899†	9,142
Sundry Charges	25,830†	8,821	28,071
Total Operating Expense	77,629	70,813	78,971

Source: City Records.

*Estimates budget figures for fiscal 1956.
†Cost of Goods Sold was included as Sundry Charges for fiscal 1954 and budget 1956, but has been changed and shown as Misc. Services for fiscal 1955.

Examination of the detail of budget estimates for 1956 gave a basis for estimated allocation of expenses to functional classifications. A resulting percentage analysis was then applied to the actual 1955 amounts for allocation. It is seen that conventional municipal accounting practices are inadequate for the accounting for the operation of a municipal airport. It is difficult for the casual observer or interested citizen to uncover the real expense-income relationship existing at the airport. Original records must be examined and interviews with several different city officials are necessary before one can present an intelligible account of these records.

Even the revenue accounts at City D require analysis before a functional allocation can be made. The gas and oil sales income is a gross sales amount with the cost of goods sold shown in another account. There is no separation of terminal building rentals from hangar rentals.

TABLE 13
STATEMENT OF INCOME
CITY D (1955)

	1955
Gas and Oil Sales	$32,733
Miscellaneous	159
Aircraft Storage	2,798
Hangar and Land Rentals	16,075
Apartment Rentals	7,073
Landing Fees	6,154
Total Income	$64,992

Source: Original Airport Accounting Records.

The landing fees are based on a sliding scale with provision for a weight frequency adjustment. The system employs a drastic reduction in average landing fees when more than four daily schedules are operated. The fee declines from $90 per schedule to $25 per schedule from the first to the fifth.

TABLE 14
LANDING FEES
CITY D

Daily Schedule	*Monthly Fee**
First	$90
Second	70
Third	50
Fourth	30
Over Four	25

*A surcharge of $1 per thousand pounds in excess of 26,000 is levied against schedules using heavier equipment.

As already noted, the apartment rentals derive from frame-tarpaper buildings in bad repair. This income, and other land rentals from non-aviation tenants is allocated as "other income." Aviation tenants lease hangars based on a 30 cents per square foot annual rental and aircraft storage is handled by fixed base operators on a 50-50 division of revenue basis.

The two airlines serving the airport pay $2.50 per square foot annual rental for office and ticket counter space in the modern, air-conditioned terminal building. The airport restaurant is assessed 5 per cent of gross sales amounting to $749 in rental income during 1955. Rent-car concessions pay 7 per cent of gross sales. Federal government offices provide over $200 per month rentals and insurance machines provide the usual $12 per month plus 13 per cent of gross sales. The functional estimates of net revenue are indicated in the following table.

TABLE 15
FUNCTIONAL OPERATING STATEMENT
CITY D (1955)

Terminal Building and Administration			
Income			
Airline Rentals		$ 2,268	
Concessions		1,258	
Govt. Offices		2,820	
Misc.		159	
Total		6,505	
Expenses		16,393	
Net Terminal Bldg. and Adm.			$(9,888)
Landing Area			
Income			
Gas and Oil Business			
Sales	$32,733		
COGS	23,584		
Gross Margin		9,149	
Landing Fees		6,154	
Total		15,303	
Expenses		19,913	
Net Landing Area			(4,610)
Hangars			
Income			
Hangar Rentals		4,080	
Storage		2,798	
Total		6,878	
Expenses		6,192	
Net Hangars			686
Other (non-aviation)			
Income			
Apartment Rentals		7,073	
U.S. Govt.		1,200	
Other		4,449	
Total		12,722	
Expenses		4,731	
Net Other			7,991
Net Airport Operating Revenues (loss)			(5,812)

The municipal airport of City D represents an airport which is a fine facility, with the bulk of the capital costs provided by the federal government, but which cannot even pay out-of-pocket operating expenses. Substantial estimated losses accrued to the operation of the Terminal Building, the Landing Area also incurred a loss, the Hangars showed a small profit, and the best showing was with the largely temporary income of the non-aviation Other Income.

An analysis of the Gas and Oil Business of City D provides a dramatic illustration of the pitfalls contained in normal municipal accounting methods.

TABLE 16
OPERATING STATEMENT
CITY D'S GAS AND OIL BUSINESS
1955

Income		
Sales	$32,733	
Less COGS	23,584	
Gross Margin		$ 9,149
Expenses*		
Salaries (4 men)		14,510
Net Income (loss)		5,361
Approximate gallons pumped	112,000	
Revenue which would have accrued to city at 3 cents per gallon		3,360
Estimated net cash loss by municipal operation		(8,721)

*Only salary expenses are considered in this conservative estimate—actually additional expenses of maintenance should also be included.

This case illustrates the usefulness of the application of cost accounting in the operation and management of a municipal airport. The real net income relationships are quickly obscured by usual municipal accounting methods.

Traffic

The two airlines serving City D operate about 4,000 flights per year which constitute some 14 per cent of the traffic movements at the field. Military movements are the highest of the cities in this study with 29 per cent, and civil aircraft make the balance of 57 per cent of traffic movements.

The 1955 population estimates place the city size at 105,000 persons and passenger boardings of 12,058 during 1955 make an average of 115 passengers enplaned per thousand population. The average number of passengers boarded per flight was 3.0. Although City D was third largest of the cities studied, it ranked lowest in passengers per thousand population, passengers per flight, and net airport income.

Management

City D has the City Manager-Board of Commissioners form of government with all major department heads reporting to the City Manager. The organization plan for the city indicates a span of control for the City Manager comprising 12 department heads, one of these being the Airport Manager. Although the Board of Commissioners has seven citizen participation boards serving in advisory and planning capacities, no such board exists for the city's airport operation.

Summary

City D is a city which received substantial airport facilities from the federal government and, as a result, embarked on a very ambitious development program. The airport cannot pay operating expenses

even with the addition of obviously temporary revenues from barracks-type housing rentals. A review of estimated functional cost accounting records indicates that the drastic sliding scale for landing fees and the municipal operation of the gas and oil business contribute to the deficit of the operation. Again the necessity of functional allocation of revenues and expenses for the purpose of cost control and setting of rentals and user charges is emphasized in practical operation.

Airport of City "E"

City E's interest in development of a municipal airport was stimulated in 1939 when the Army Air Corps, operating at a private field, threatened to move out unless improved facilities could be provided. A bond election for the purpose of "protecting City E's position on the air maps" was called and $125,000 in general obligation bonds were authorized for the project. The amount was spent for the purchase of the 230-acre field and for the paving of the runways.

Two years later, under press of defense requirements, the military air arm proposed that the city participate in developing a field lying halfway between the city and another smaller city, about ten miles from each. Ironically, the bond issue election was called for December 1, 1941, one week before the project was to be forcefully changed from a defense to a wartime endeavor. Initial commitments of the city were for $60,000 in improvements with the agreement that the federal government would spend an additional $289,000. It is obvious that military expenditures exceeded this amount at the field which has three major runways ranging in length from 6,499 to 6,642 feet. In addition, a water and sewerage system was built and many buildings were constructed at the base. After the war the facility was turned over to City E by the federal government with the understanding that the city would maintain the field and utilities for use in any national emergency.

Table 17
Operating Expenses
City E

	1954-55	*1953-54*
Personal Services:		
Management	$ 8,400	
Clerical	3,410	
Labor Operations	45,010	
Extra Help	328	
Total Personal Services	57,148	$53,612
Supplies:		
Office	671	
Food	52	
Clothing	143	
Minor Tools	198	
Janitor	440	
Chemicals	152	
Total Supplies	1,656	2,076

TABLE 17 (Continued)

Contractual:		
Communications	797	
Hire of City Equipment	6,295	
Insurance	640	
Special Services	7,516	
Advertising	242	
Traveling Expense	1,013	
Heat	4,175	
Light and Power	12,592	
Laundry	13	
Other	86	
Total Contractual	33,369	25,227
Maint. of Structures:		
Buildings and Grounds	9,180	
Disposal Plant	239	
Sewers	....	
Water Wells	1,850	
Runways	336	
Water Mains	226	
Total Maint. of Structures	11,834	13,710
Maintenance of Equipment:	1,041	396
Bad Debts:	309	1,428
Total Expenses:	105,357	96,449

Operating Expenses and Revenues

The allocation of expenses and revenues for City E is probably the most difficult and least accurate of the cities in this study. This results from lack of a cost accounting system (one was installed in mid-1956) and from the magnitude of non-airport revenues and expenses. The facility rents about 150 residential and 50 commercial units which are composed of buildings remaining from military development of the field. Again, the municipal accounting system confounds the researcher in attempting to determine net revenues of the airport functions. Of course, for City E, this is relatively unimportant since a cost accounting system is now operative which will provide accurate monthly information for management.

The city does not operate a gas and oil business, but rather franchises this activity to the fixed base operators at 4 cents per gallon. In spite of this, there is a substantial Labor Operations account which must be allocated to the airport functions largely on the basis of estimates and "guestimates" of airport administration and of the researcher. The city classification of expenses is evident in Table 17.

The income statement of City E presents an unusual condition. The income from Gas and Oil Franchises nearly equals the income from commercial airline landing fees—and without municipal operation of the fueling facilities. Other revenue accounts are readily allocable except for the Aviation Income account which had to be further analyzed. Review of original accounting records showed that about

$15,000 of this account derived from terminal building income. The coffee shop paying $165 per month plus 5 per cent of gross sales (over $6,000) made up nearly $3,000 income. Rent-car paying $40 per month plus 7 per cent of gross contributed a surprising $5,187, and the two limousine operators (one to each of the neighboring cities) paid 5 per cent of gross sales amounting to about $1,800 income. The airlines pay $2 per square foot annually amounting to nearly $4,000.

The remainder of the Aviation Income account derived from fixed base operator and airline service building rentals amounting to over $12,000. This amount was allocated to Hangars.

TABLE 18
OPERATING REVENUES
CITY E AIR TERMINAL
FISCAL 1955

Revenues	
Residential Rentals	$ 62,609
Commercial Rentals	53,062
Aviation Income	27,300
Landing Fees	15,471
Utilities	5,140
Gas and Oil	14,892
Miscellaneous	4,753
Total Revenues	183,227

Landing Fees are based on $70 per month per schedule for aircraft up to Convair weight (39,000 pounds) with a surcharge for additional

TABLE 19
FUNCTIONAL OPERATING STATMENT
CITY E (1955)

Terminal Building and Administration		
Income		
Concessions	$ 11,020	
Airline Rentals	3,960	
Govt. Office and Misc.	92	
Total Incomes	15,072	
Expenses		
Personal Services	26,742	
Supplies	1,656	
Contractual	11,104	
Maint. Structures	1,076	
Maint. Equipment	260	
Total Expenses	40,838	
Net Terminal and Adm. Income		($25,766)
Landing Area		
Incomes		
Landing Fees	15,471	
Gas and Oil	14,892	
Total Incomes	30,363	

TABLE 19 (Continued)

Expenses		
Personal Services	6,842	
Contractual	7,905	
Maint. of Structures	3,733	
Maint. of Equipment	260	
Total Expenses	18,740	
Net Landing Area Income		11,623
Hangars		
Income	12,228	
Expenses		
Personal Services	8,182	
Contractual	4,629	
Maint. of Structures	3,186	
Maint. of Equipment	261	
Total Expenses	16,258	
Net Hangar Income		(4,030)
Other		
Incomes		
Residential Rentals	62,609	
Commercial Rentals	53,062	
Utilities	5,140	
Miscellaneous	4,753	
Total Incomes	125,564	
Expenses		
Personal Services	15,382	
Contractual	9,731	
Maint. of Structures	3,839	
Maint. of Equipment	260	
Bad Debts	309	
Total Expenses	29,521	
Net Other Income		96,043
TOTAL OPERATING INCOMES		$77,870

weight at the rate of 8 cents per thousand pounds-per landing. Although the present landing fees constitute no sliding scale, a fee of this type is being considered by the administration as follows:

First 10,000,000 pounds	9¢ per thousand
Next 5,000,000 pounds	8¢ per thousand
Next 5,000,000 pounds	7¢ per thousand
Over 20,000,000 pounds	6¢ per thousand

The effect of the application of a sliding scale basis for landing fees is discussed in the conclusions.

Traffic

The commercial airline schedules at the field make up about 25 per cent of the traffic movements, military flights 16 per cent, and the civil aircraft 59 per cent of the movements.

The population of the two cities serviced by the airport totals 97,000. Passenger boardings of 49,428 represent 496 boardings per

thousand and 6.2 passenger boardings per flight for 1955. On these bases, City E has the most favorable traffic characteristics of any of the cities included in this study.

Management

The city has the City Manager-Council form of government and the Director of Aviation reports directly to the City Manager. The airport presents the largest job for administration in terms of facilities and income of any of the cities studied. The magnitude of the total net revenues of the airport seems misleading, however, since the administration faces a problem similar to that of City D. An independent consultation has recommended that 50 per cent of the ex-military buildings which provide non-airport income should be abandoned and that the "outlook for development of permanent commercial businesses on land leased or sold by the city is not bright." Such conditions present a vital challenge to management of this municipal airport.

Summary

It is seen that City E has the largest operation of the cities studied, resulting from exceedingly high non-airport activity income. It is estimated (rather "guestimated") that the Terminal Building and Hangars operated at a loss. The Landing Area, because of relatively high franchise income, turned a profit. The bulk of the net income (under any accounting system) clearly derives from non-airport activities. These are temporary and will not continue unless substantial investment is made.

The introduction of a cost accounting system by this airport promises to enlighten the administration to the need for cost control and analysis. The traffic characteristics of this airport promise opportunity for profitable operation—even on the basis of airport functions.

General Conclusions

The analysis of municipal airport development at medium size cities gives rise to reflection upon some of the principles of municipal airport operation which have presented themselves. These should be generally applicable conclusions which might be drawn from the study of airports here included and which may provide a sound basis for policy decisions for airports of this type.

First, consider the more general question: By what philosophy do cities provide and operate airport facilities? The alternatives (in the broad sense) are free business enterprise, regulated public utility under private ownership, public-ownership with private operation, and public ownership and operation. Since this is the basic starting point in evolving principles, some discussion is in order.

The "Bollinger Report" drew conclusions of interest to this question:[4]

[4] *Ibid*, p. 3. (Italics mine)

> A basic conclusion of the study is that the *majority of terminal type airports can be made self supporting within a comparatively few years without an undue burden on aviation,* provided that a sound financial plan is established and all revenues are aggressively developed.

Further, the study concludes that aviation "like other means of transportation should, in the best public interest, be on a self-supporting basis." The report sets forth some rules or principles concerning the operation of terminal type airports:[5]

> The airport owner should not exploit interstate air commerce by charging excessive fees, but is entitled to collect a reasonable fee to cover his *full cost* of the services rendered.
>
> Each user of the airport should pay proportional charges to cover his share of the cost of those facilities needed and used by him.
>
> Each user's share of the costs should include annual operation and maintenance expenses, *interest and depreciation on the prudent investment* in facilities required for his purpose, and an equitable local tax charge.

What has happened since the "Bollinger Report" set forth such optimistic predictions of self-sustaining airports, charging fees to cover their full costs of operation? Ten years later it is pointed out that "few airports are self-supporting, although traffic is rising so rapidly that *some* of the metropolitan airports are paying their way *or soon will be.*"[6] This is a far cry from the expectations that most terminal type airports would soon (after 1946) "pay their own way."

The following general conclusions are based on a rather limited study of five municipal airports serving medium size cities. This admittedly does not approach a random sample of the characteristics of airports, even those of medium size cities. Rather, this sample includes airports picked for their characteristics to indicate different kinds of problems. For example, one of the facilities has been built completely on virgin land since the war; two represent airports which do "pay their way"; and another has a fine facility which cannot even pay its direct costs of operation. The contrast of these operations provides the basis for deriving some general principles.

> 1. In general, the capital cost characteristics of terminal type airports at medium size cities preclude the use of private capital for their construction.

For many years federal government has regulated railroads and electric utilities partly because the exceedingly high capital costs and the sunken capital nature of these businesses render them unsatisfactory for free competitive business enterprise. Indeed, in many countries these industries are owned and operated by government. Each airport included herein boldly proclaims the fact that airports have much higher capital costs (lower capital turnover) in physical facilities which, if possible, are more sunk than in the case of railways and elec-

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[5] *Ibid,* p. 6. (Italics mine)
[6] *The Wall Street Journal,* Feb. 1, 1956, p. 4. (Italics mine)

tric utilities. A further extension of this principle might well be that airports at medium size cities cannot be expected to pay their way (that is, to cover all costs of operation including capital costs) out of airport function revenues. Even at the two paying airports in this study, it is seen that the city operating as farmer or rentier (not as airport operator) makes this possible—not to mention the fact that the bulk of capital costs at these facilities were borne by the federal government.

Thus it is determined that, if a city is to have an adequate airport, the municipality (or some other agency of government) must contribute the capital investment to build the physical facilities. This leads directly to another principle:

> **2. The decision whether or not to have an adequate municipal airport is principally a political one — to be decided by the voters at the polls. It cannot and should not be determined by the economic criteria of whether or not such a facility can "pay its way" or be profitable to the city.**

If an airport could be operated profitably, to cover full costs and pay in lieu of taxes income to the city, then there is question about the propriety of its being a publicly owned facility. It should then be either free business enterprise or a regulated public utility. It is established that such a facility cannot pay its own way (on the basis of airport functions), and therefore the question becomes political. It is political in that the decision must be based on public interest factors such as pride of the community, usefulness of the facility to the residents of the community, and the indirect benefits to commerce of the community deriving from commercial airline service. Once this political decision has been made, then the economist must be called upon to implement the decision in the most efficient way, whether or not full costs of operation are covered.

An important decision is the determination of the kind and extent of the physical facilities. For example, the length and number of runways, the size and construction of the terminal building, and the kinds of hangars must be determined. As seen, the bulk of the investment at an airport is in providing the landing area. The landing area facilities for minimum operations are determined largely by the size of the largest planes to serve the city, the natural characteristics of the field for drainage and grading, and the climatological characteristics of the area. The principal determination, though, lies with the size of the commercial airliners which will serve the city. This indicates the third principle concerning the magnitude of capital investment required at an airport.

> **3. The physical facilities which must be provided are determined largely by the airline traffic burden (aircraft and passenger) upon the facility.**

A city does not have much discretionary authority in determining the facilities which it will provide. The major investment, runways,

is determined by the kind of aircraft which will serve the city. Terminal facilities must be provided to accommodate passenger traffic burden. The airport must be designed initially for ready expansion as additional traffic is generated or additional airlines are certificated to serve the city. Failure to provide the minimum facilities, to maintain them after they are provided, or to expand them as needed can only result in suspension of commercial air service to the city.

An example of the rapidity with which cities must respond is seen in the change in runway requirements since the 1946 Bollinger Report:

TABLE 20
RUNWAYS FOR VARIOUS SIZE CITIES

Kind of Terminal	*1946 Runway*	*1956 Runway*
Limited Stop Airport (Pop. 30,000-300,000)	3500-4500	5000-6500
Intermediate Terminals (Pop. 300,000-1,000,000)	4500-5500	6500-8000
Major Terminals (Pop. over 1,000,000)	5500-6500	8000-10,000

With the introduction of 118 passenger jet airplanes, the heavier aircraft now in use on long stage routes will be moved down to shorter stages through the intermediate cities. It appears that the runway requirements for airports will continue to increase for these intermediate cities over the next ten years. Rather than meditating upon the question concerning when these facilities will reach maturity and become paying airports, city administrators will do well to ponder the source of funds for the next runway extension!

Once the physical facilities have been provided and the installation becomes an operating airport, many more decisions concerning these operations must be made. The basis for these decisions is important. Sound decisions can result from a base of sound accounting for the operations of the airport. Consequently, another important principle concerns the methods of accounting for the net incomes of the various functions at an airport.

> 4. The accounting for operations of an airport should be maintained on an accrual-cost accounting basis, with costs and revenues allocated to accounts on the basis of airport functions as well as by source.

There are many decisions which should depend upon accurate cost accounting analysis if they are to be the best possible decisions. One of the more obvious areas where this is true is in setting user charges. If airport administration is unaware of the income-expense relationships existing for each of the airport functions, then logical user charge policies are difficult to construct. Another area in which cost accounting results are useful is in cost control. The identification of costs of operation with the functions for which they are incurred is a necessary prerequisite for effective cost control.

Every airport administrator should have monthly operating statements to show him how his airport is operating. As elementary as this may seem, only one of the airports in this study has in the past provided airport management with this valuable tool.

TABLE 21
RECOMMENDED FUNCTIONAL ACCOUNT CLASSIFICATION

Terminal Building
- Incomes
  - Airline rentals—include terminal building office rental, other building rentals, gasoline tank rentals, antenna location rentals, etc.
  - Government offices—include terminal building offices, all other buildings rented by CAA or Weather Bureau including control tower and antenna sites.
  - Concessions—includes all payments deriving from concessionaries including restaurant, rent-cars, vending machines, telephone booths, etc.
  - Miscellaneous Rentals—income from offices other than listed above.

Landing Area
- Incomes
  - Scheduled Landing Fees—all landing fees computed on a monthly schedules per day basis for airlines.
  - Non-scheduled Landing Fees—landing fees collected from non-scheduled commercial operations, and military landings.
  - Gas and Oil Franchise Income—all payments by the franchised Gas and Oil dealers on the field.

Hangars
- Incomes
  - Fixed Base Operator Rentals—include rental on fixed base operator hangars, city's per cent of gross on tie down and outside storage, and the per cent of gross sales, if any.
  - Other Hangar Rentals—include rentals of city owned "T" hangars and all other hangar rentals.

Miscellaneous
- Incomes
  - Sales—include sale of surplus land and/or property regardless of functional use.
  - Agricultural and Industrial—include all non-aviation rentals (except in terminal building).
  - Other Income—include all additional miscellaneous incomes, e.g. incomes from air shows or military rentals accruing from special exercises or maneuvers.

A similar classification of expenses allows computation of the net revenues accruing to each of the airport functions.

5. All possible commercial operations should be delegated to private operators under lease agreements of sufficient duration to permit aggressive development by the operators but not so long as to eliminate city control of unfit operators.

This principle rests upon the assumption that private operators of commercial activities at municipal airports can and will develop net revenues exceeding those which normal municipal operation will produce. There are no doubt exceptions to this general principle where very good municipal operation exists or where exceptionally poor

private operation is in evidence. However, the conclusion of this study is that, in general, the positive incentive of profit should be utilized in private operations to render the greatest net revenues to the airport. In order to do this, operators must be assured that their time and investment will be protected for a sufficient length of time to allow them to develop their enterprises. At the same time the municipality must protect itself against entrenchment of an unfit operator by providing some kind of occasional renewal of the agreements.

The operation of fueling facilities represents the kind of activity referred to in this principle. Three of the cities studied operated municipal fueling facilities. For at least two of them, the net revenues of the airport would clearly have been increased by franchising fueling activities to private operators.

> 6. Airline rentals in the terminal building should reflect full cost (operating and capital costs) including a share of the building management costs for a proportional share of the public space. Concessions should be charged "what the traffic will bear" consistent with adequate service (percentage of gross sales agreements). Government offices, where terminals have been built with federal assistance, should pay nominal rent plus a full share of the building management costs.

Assuming that a functional terminal building is used (*as opposed to the monument type terminal so common for railroads*), the airlines should be willing and able to pay full costs of their share of the facility. For concessions, "what the traffic will bear" will be different at different airports. One airport in this study subsidized its coffee shop just to keep it in operation. At another extreme it has been noted that concessions in 1955 at the Detroit airport amounted to 70 per cent of the cost of operating the airport.[7] Results of aggressive development of concessions are indicated in the fact that at Denver and Newark some 80 per cent of the dinner revenues at the airports are generated among local citizens who do not come to the airport for aviation purposes.[8]

The most common agreements at the cities in this study called for 5 to 7 per cent of gross sales of restaurants, 10 per cent for rent-car and limousine operators, and 7 to 10 per cent of gross sales for non-food item concessions.

Another important problem is determination of the basis for setting the landing fees of the airlines. These are user charges intended to reflect the airline's share of the operating costs of the Landing Area. Discussions with airport administrators suggest the next principle:

> 7. Commercial airline landing fees should reflect *net* landing area costs of operation and should be based on a simple weight-frequency scale *with no provision for sliding scale or quantity discount.*

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[7] R. W. Ireland, "Airport Problems of the Airlines," *J. of Air Law and Commerce*, Winter 1956, p. 15.

[8] S. B. Richmond, "Some Aspects of Planning for New Sources of Airport Revenues," *Ibid.*, p. 21.

Each airport included in this study has utilized some form of a sliding scale in the setting of landing fees. This is a form of quantity discount which provides a decreasing average landing fee as the number of schedules operated by an airline increases. One of the airports intends to abandon the sliding scale in favor of a simple weight frequency fee. The reasoning behind this is based on doubt that there are any significant economies of scale resulting from increased usage of the landing area by a carrier. Wear and tear, and therefore costs of operation are largely a function of the number of landings by the heavy commercial airliners.

Ordinarily quantity discounts also have the purpose of increasing business (revenues) by encouraging purchase of greater quantities. Landing fees, however, constitute a very small part of airline costs and it is doubtful that the level of landing fees bears significantly upon the decision to operate additional schedules. Of course, this decision is based upon more important factors such as traffic estimates and equipment utilization.

Additional factors enter into the consideration of the usefulness of the sliding scale. The use of this type of landing fee, where reductions of over 50 per cent after the fourth schedule are noted, clearly charges the airline with the least number of schedules a higher average landing fee than is paid by a competitor having more favorable routes, operating more schedules, and therefore better able to help defray landing area costs. The opposite should be the case. The greater the traffic load out of a station for a particular airline, the more profitable will be the operations. With increased traffic, the airline will use larger, more efficient aircraft. This, at the same time, will increase even more the profitability for the airline, and increase the cost of operation of the landing area. There seems no justification for decreasing the average landing fees for such a carrier while maintaining higher average fees for a weaker competitor, operating smaller equipment, and generating less traffic. The following table illustrates the increasing revenue producing capacity of aircraft as size increases.

TABLE 22
COMPARISON OF GROSS WEIGHT AND PASSENGER CAPACITY
SHORT STAGE TYPE AIRCRAFT

Type of Aircraft	*Gross Weight*	*% of DC3*	*Passengers*	*%DC3*
DC3	25,200 lbs.	100	21	100
Convair 340	47,000	186	44	210
Viscount 810	67,500	268	52	248

Source: *American Aviation,* April 23, 1956, p. 141. The seating configurations are for basic 1st class arrangement.

These relationships combined with the lower seat-mile costs of operation suggests that the economic ability to pay landing fees increases with the size of the aircraft. This relationship does not hold

true for the long haul four engine aircraft, but this is of little consequence since these medium size cities receive little if any four engine service.

Determination of the weight-frequency assessment on the basis of a fixed fee per thousand pounds of landing weight should be made by analysis of the net landing area costs. These may be determined by deducting landing area revenue (other than commercial airline landing fees) and net terminal building revenues (after full costs including capital costs) from the total operating costs of the landing area. The resulting net cost would then be assessed uniformly against landing gross weight of commercial airliners. This general method of determining landing fees, of course, would have to be adapted to the peculiar problems of the various installations.

Another problem lies with the determination of the rentals which the fixed base and hangar operators should pay. A rental basis must be designed to attract competent operators and at the same time provide a fair contribution to airport revenues.

> 8. Fixed base operators should be charged minimum fixed rentals reflecting the operating costs of the function plus a percentage of gross sales (except from the sale of aircraft) reflecting ability to pay.

There are some difficulties in applying Bollinger's full cost assessment against airport tenants and users. The main difficulty is that, at current stages of development, they cannot pay such costs and earn enough return to attract competent operators. A more realistic approach is to set out-of-pocket costs accruing to the city as a minimum rental. Add to this amount a per cent of gross sales which will increase the income to the city as the operator develops and enlarges his business. The incentive to do a good job remains in this scheme without burdening the operator with an intolerable initial rental expense. More than any other lessee at the airport, the fixed base operator must work long and hard to build his business. His business is providing and maintaining safe airplanes for his customers. As a competent operator builds the confidence of his customers in his service, his business will increase. But if an attempt is made to collect full cost rentals at the outset, competent operators may not even enter the field.

The reason for excepting the sale of aircraft from rental computations is that this is an auxiliary function which adds no cost to the airport, and is conducted in intense competition with other dealers at other fields. A charge against such sales would place the operator at a competitive disadvantage with other dealers to the detriment of the local operator.

> 9. The line of authority and responsibility between airport administration and top-level municipal policy making should be direct, without intermediaries who are concerned with usual municipal administration activities.

Airport administration is a hybrid activity among city administration functions. The capital cost requirements require municipal intervention into the field. However, the net revenues, and thereby the public contributions, are determined to a large extent by the successful development of commercial activities which are clearly outside the focus of usual municipal administration.

On the contrary, aggressive development and promotion by free business enterprise of operational activities is paramount in the successful overall operation of the airport. For this reason the chain of command must link directly from the airport management to the municipal policy-making function. The Airport Manager should be directly responsible to top city management. Cases have been shown of responsibility to the top executive officer of the city or, in one case, direct responsibility to the city legislative group. The latter is a radical departure from the established patterns of the City Manager type of government and would probably meet great resistance at other cities.

Another consideration is the type of executive leadership which exists at an airport. Salary scales of cities in this study ranged from a low of $4,200 (at the city having the most favorable traffic characteristics) to a high of over $10,000 per year (at a city having considerable non-airport function income). A really qualified airport manager must be not only a public servant. He must be a one-man airport Chamber of Commerce; public relations specialist; one thoroughly familiar with problems of commercial airlines, fixed base operators, and private flyers; and a man who is capable of negotiating contracts and of pleading the city's case before governmental aviation hearings.

The business of aviation is a constantly and rapidly changing one. Successful airport administration is dependent upon the ability of airport policy to change and adapt to these ever changing conditions. The ability to do this depends to a great extent upon competent executive leadership and the existence of direct channels of authority and responsibility between airport administration and top level city management.

The Problems Reconsidered

At this point the Bollinger Report questions noted in the introduction may be reconsidered 10 years later. The first question (concerning by what standards inadequacies in present practices be determined and corrected) has been involved to a large extent throughout this study. The conclusion is that the starting point for such analysis rests with cost accounting methods. The allocation of expenses and revenues to the various airport functions provides the basis for determining and correcting inadequacies.

The second question concerns the propriety of furnishing airports at public expense. The second principle set forth above concerns this question and provides that such a question is one which the commu-

nity must decide at the polls. The question is whether or not the community is ready, willing, and able to finance an airport. Even with the availability of federal government matching funds, a community must be prepared to make a substantial local investment in its municipal airport. The next question of user charges has been treated above in principles 5 through 8.

The final question of whether or not the municipal airport of the medium size city can become self-sustaining without placing an undue burden on aviation requires further comment. The analysis depends upon the meaning of the term self-sustaining. The Bollinger Report envisioned self-sustaining airports as those which earn revenues equal to the sum of operating expenses, depreciation, debt service or bond interest payments, and "in lieu of tax" charges (intended to reflect the loss of tax income to the city by converting land to airport use). If this definition of self-sustaining is accepted, then the conclusion of this study is that these airports cannot become self-sustaining on the basis of airport function revenues. Only where substantial non-airport function revenues (such as agricultural or industrial revenues) have been developed are self-sustaining operations in evidence. At the two self-sustaining airports in this study over 50 per cent of total revenues were derived from agricultural, industrial, and residential rentals.

For communities not blessed with the possibilities or the community desire to enter into these activities, another concept of the term "self-sustaining" is in order. In such cases the community must recognize that favorable traffic characteristics, sound management and cost control and aggressive development of concession revenues will be necessary even to make the airport self-sustaining on the basis of operating expenses. If the community is satisfied with the operation of its airport on this basis it may well be called self-sustaining.

Thus the answer to this last question of the Bollinger Report is not yet clear, especially in the case of airports at medium size cities; rather, it is a question which will remain to be studied by each community when it determines its municipal airport needs and aspirations.